BIOLOGICAL NOTES ON TRISHORMOMYIA PANDANI FELT, ITS GALLS AND ITS PARASITE

by

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Place of occurrence.

During a holiday in July 1919 at Tjibodas (Mountain laboratory of the Botanical Garden at an altitude of 1450 meters on the slope of the Gedeh, Java) my attention was drawn by curious galls on the leaves of *Pandanus nitidus* KURZ. This plant is in the virgin forest near Tjibodas very abundant. From Dr. DOCTERS VAN LEEUWEN, the present Director of the Botanical Garden, who has been studying since several years the galls on plants of the East-Indies I got the information that he had found the same galls some time before, but, as they were always empty, he did not yet describe them.

In the forest near Tjibodas I found, that on the older, visible parts of the leaves the galls are always empty, but young galls could be found at the base of the older leaves or on very young leaves.

Description of the galls.

Old galls. (Plate IX and X).

As old galls are most conspicious and are sooner observed than the well concealed young undeveloped ones, I shall describe the old ones first.

They can reach a total length of 4.5 c.M. even 5 c.M. and a width of 1,5 c.M, but smaller ones are also often found. The old galls are oval, of the same colour as the old leaf viz. dark green excepting a longitudinal more or less oval pale-brown (discoloured) spot (see plate X) often with a narrow fissure, which is connected with the excentrally placed „breathing" hole of the larva of 1½ to 2½ m.M. in diameter.

In most cases the hole is found at the underside of the leaf.

In old galls generally the breathinghole of the larva is open, seldom closed by a yellow coloured stuff; in some cases the membrane is pierced by small holes of different size, evidently not made by the legal inhabitant but by its parasites.

The surface of old galls is entirely smooth. I never found them on the mid rib of the leaves and always on the leaf surface. By cutting the galls longitudinally they show a curved larval chamber as shown on plate XI, fig. 5.

As shown on plate IX and X the surrounding normal pandan leaves are much disfigured by the pressure effected by the galls, as the latter are much thicker than the normal leaf, as can be seen on plate XI fig. 4.

The development of the galls (plate VIII, a — f).

Old galls appeared nearly always to be deserted by its inhabitants, in some rare cases they contained parasites. As galls are as a rule formed in still growing, not yet quite developed parts of plants, it was clear that the young not yet quite developed galls must be sought for in the younger and youngest leaves in the heart of the plants and indeed they were found there in all phases of development (see plate VIII). As the hidden basal parts of young leaves are not yet green but yellowish white, the young galls are coloured as the young leaves. When the leaves grow out while the galls develop and the latter therefore are exposed to light, the galls turn pale green.

In this phase of development the larva has already closed its window by a sheet of silk.

As the larva is only gradually enclosed by the growing tissue, it is very probable, that the egg (or the larva) is laid on the epidermis and not *in* the leaf, otherwise the very young larva should have been found within the leaf tissue.

The egg was not found. The smallest gall which could be found was nothing more than a very faint swelling or blister in the leaf tissue, measuring 2 m.M. in length. In the centre a very shallow excavation could be observed wherein an exeedingly small nearly translucent larva with cloudy orange spots was feeding.

Bigger older galls show a deeper and larger excavation (plate VIII fig. a — c) and a surrounding wall or edge of greater height. In still older galls of 1 — 1½ c.M. length the walls of the excavation are drawing near each other on one pole (fig. d) leaving at the other pole a hole; and still later the walls of the narrow excavation are meeting entirely only leaving the

circular opening where the orange red body of the larva can be clearly seen (plate VIII fig. e). In some cases it was observed that the larva puts its anal segment in the opening.

A scheme of the development of the galls and sketches of longitudinal and cross cuts of galls are given on plate XI.

Summarizing the development runs as follows.

1. The egg or the larva is laid on the surface of the epidermis of the underside of young white, yet growing leaves near the top of the plant;
2. around the larva the leaf develops an oval shaped swollen adge;
3. this edge overgrows the larva and closes above it leaving only one round hole, which allows communication with the air, until pupation, when it is closed by the larva;
4. under the larva the leaf tissue developes abnormally too, but not quite in the same degree, as the walls enclosing it.

The description of the larva and pupa follows here.

The larva.

The fullgrown larva is about 5 m.M. long and 1.3 m.M. broad. She is red coloured (as the inside of a carrot). The contents of the body shines cloudy through the transparent skin. On the pleural side of every segment a very small black protruding spot can be seen, which is placed on a tubercle. As the tracheae terminate in these black spots they surely are stigmata, so the larva is amphipneustic. The larva is — as a true dipterlarva — not provided with legs. The skin is absolutely bare, shiny and smooth. The anal segment however shows two processes or sacks, which are of the same character and colour as the rest of the segment but the ends are transparant white, at least in the living larva.

The first segment, the head, is very small and not chitinous, the mandibles (mouthhooks) however are clearly visible.

The smaller larvae show the same type and colour.

Before pupation the larva closes the breathing hole by spinning a thin membrane. A second similar membrane was found just above the pupa.

The pupa.

A well developed pupa is 4½ m.M. long and 1½ m.M. broad. It has in general the same colour as the larva. The sheaths of the wings and legs are more transparant and of a lighter shade than the abdomen. The legs are very long and reach till the half of the last segment. On the head 2 small

pointed processes can be observed, it is very probable, that they are used for penetrating the two membranes which close the larval tunnel. Behind the head the funnel-like protruding thoracical stigmata can be seen. Shortly before emergence of the imago the wing sheaths and legs are coloured black, the thorax brown and the abdomen red. For a description of the imago can be referred to the preceding paper.

Parasite (Chalcidid), Plate XII, fig. 6 and 7.

In one case the pupa of this parasite was found in a gall near the empty pupal skin of the gall midge; in another case a white, rather large egg of a parasite was found near a pupa.

These facts give some evidence as to the character of the parasite, which very likely attacks the pupa.

The chalcidid parasite was bred from the galls several times and is the most effectual ennemy of Trishormomya.

A description of both male and female follows hereunder.

The name of this, very likely new species shall be mentioned later.

Male. (fig. 6).

Length 3 to 3,5 m.M. Head metallic bright green, eyes brownish red mouth parts pale brown; antennae: scapus yellow, other parts brown; ocelli brownish black or black. Antennae consisting of scapus, pedicellus, anellus and 8 funicular joints, the last one large and consisting out of three parts.

Thorax metallic green with honeycomblike sculpture; mesopleurae black. Legs pale yellow (nearly white) excepting two thirds basal of the posterior coxae which are metallic green with blue iridescence, canaliculate.

White hairs are scattered all over the thorax and are also seen on the posterior coxae. Wings hyaline, pubescent.

Abdomen: first segment entirely and second segment partly yellow, rest of second and other segments black and dark brown with faint greenish iridescence.

Female. (fig. 7).

Size 3,5 to 4 m.M., terebra 3 m.M. Colour like the male, excepting the abdomen on which the black colour is limited to the dorsal area of the apical half. Terebra piceous.

In another case other smaller parasitical larvae were found but this species has not been bred by me.

EXPLANATION OF THE PLATES.

Plate VIII.

a-c. Very young galls; the fissure is not yet closed (nat. size).

d. The fissure is closing (nat. size).

e. Fullgrown but still white galls; the hole is still open (nat. size).

f. The holes are closed by a membrane (nat. size).

Plate IX.

Part of a Pandanus plant to show galls in situ, on the left empty galls, to show the discolored streak. (± ½ of nat. size).

Plate X.

Some leaves quite covered by old galls; in one the membrane is still closed (nat. size).

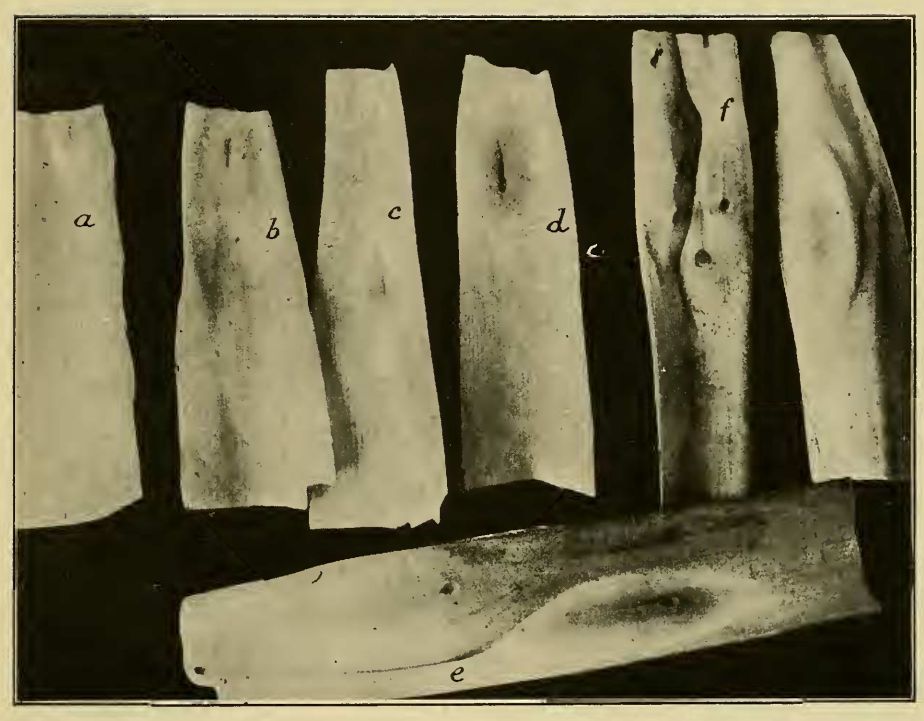
Plate XI.

1. Cross cut through very small gall. The black spot, also with the other figures, is the young larva. The excavation is still entirely open (real size 3 m.m.).
2. Older gall, the excavation is closing (real size 12 m.m.).
3. The same gall cut longitudinally (real size 17.5 m.m.).
4. Older gall, the fissure is closed (cross cut, real size 15 m.m.).
5. Old gall cut longitudinally to show the larval chamber (real size 40 m.m.). B: the breathing hole.
6. Schematic view to show development of the gall.

Plate XII.

1. Larva (real size 5 m.m.).
2. Pupa, side view.
3. Pupa, ventral view. } real size 4½ m.m.
4. Anal segment of larva (real width 1½ m.m.).
5. Female (real length 4.5 — 5 m.m.).
6. Chalcidid parasite, male (real length 3.5 m.m.).
7. „ „ , abdomen of female (real length: abdomen 1¾, terebra 3 m.m.).

(Pen drawings made by KADES, photographs and plate XI by author).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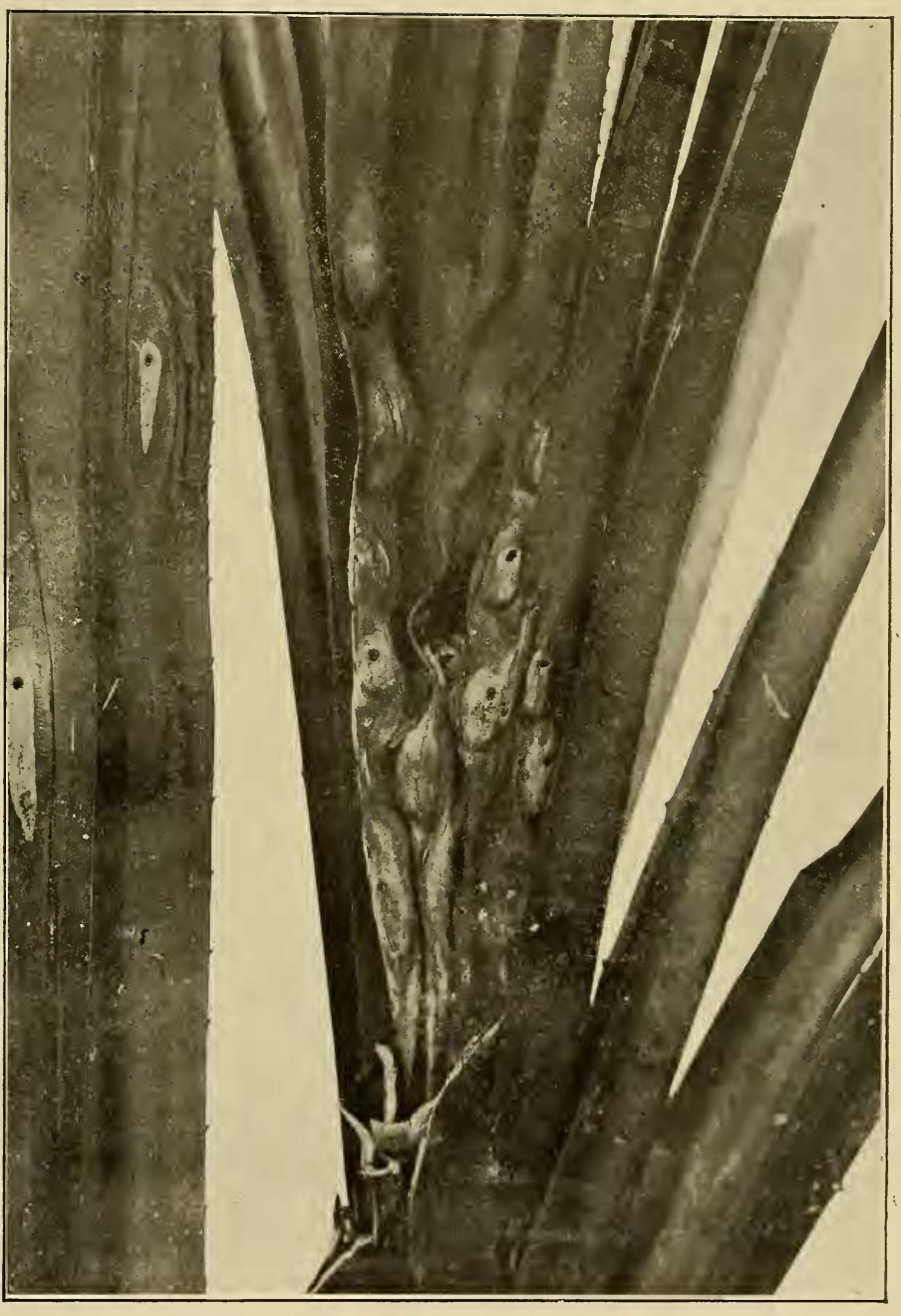

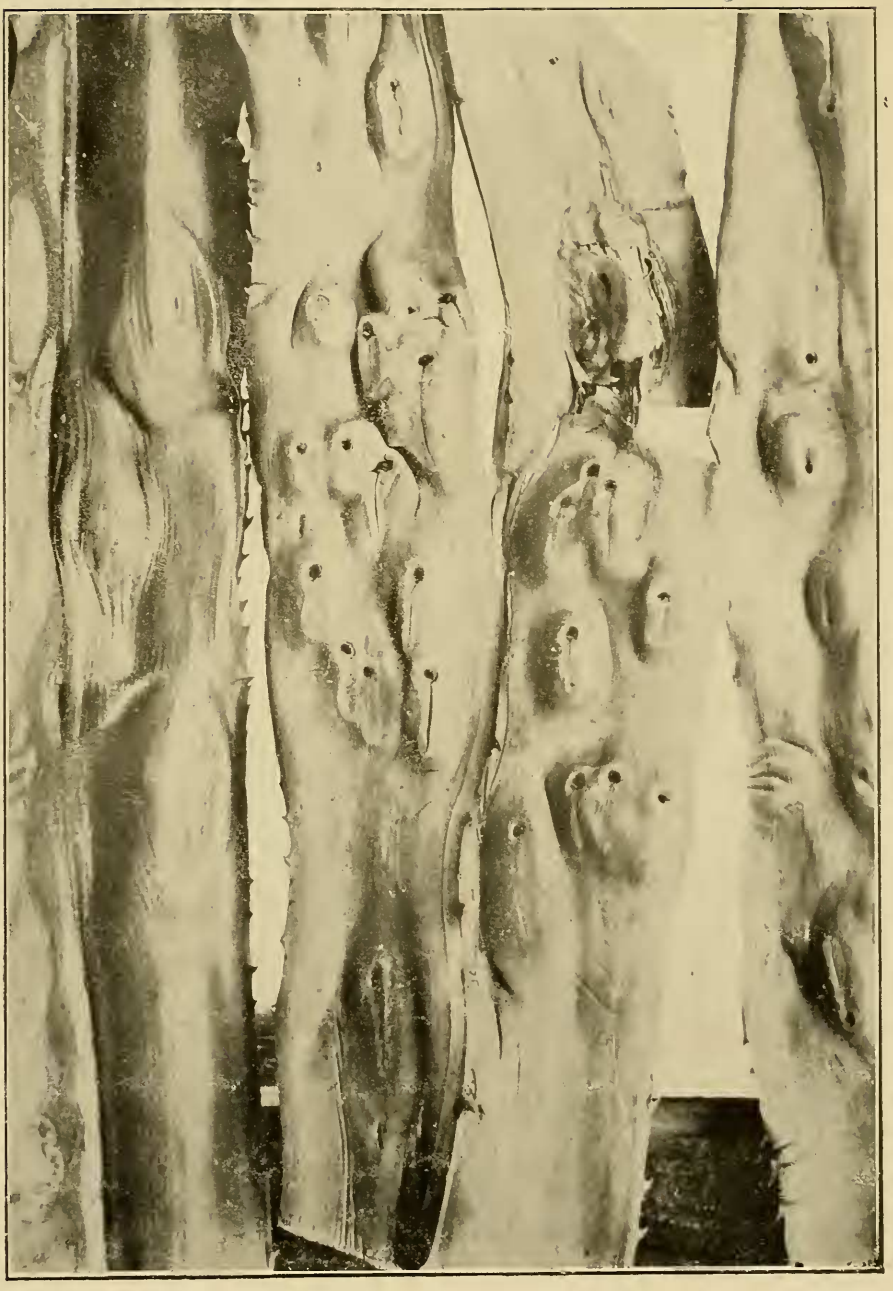


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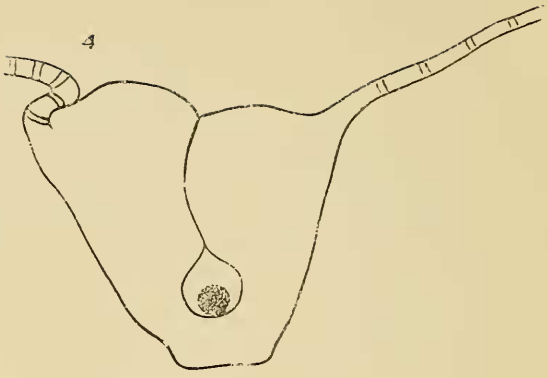
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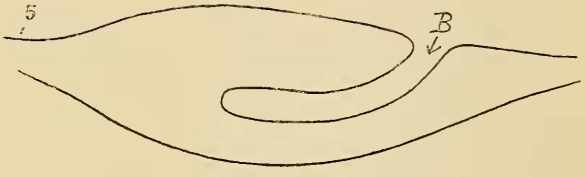
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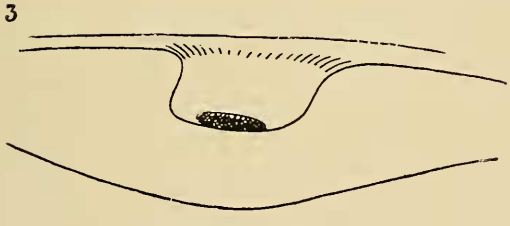
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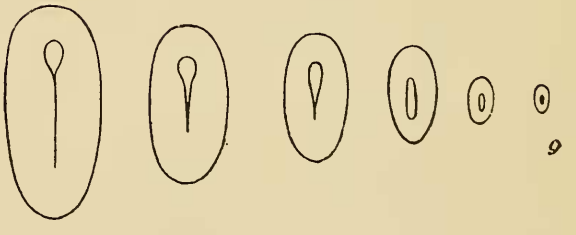
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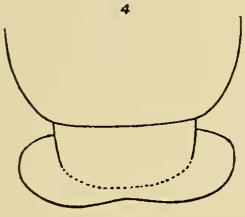

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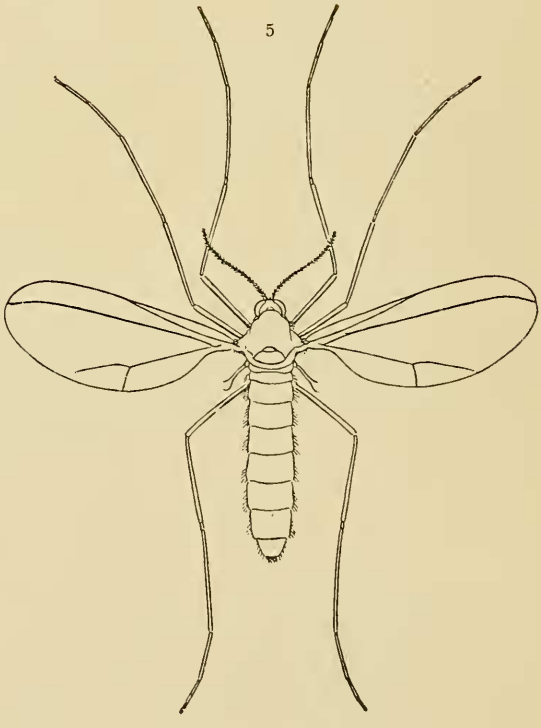

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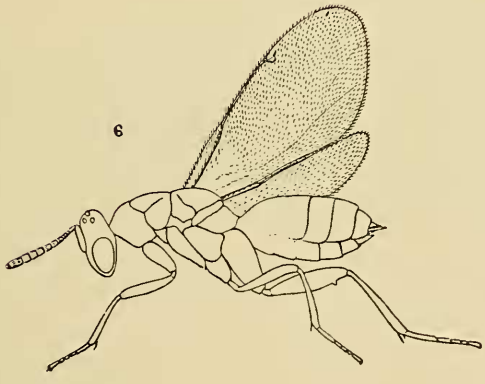

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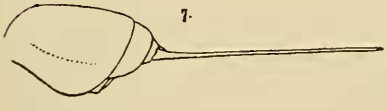

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